Interpretations of Nature; Astrology; Primitive Counting and Geometry; Mathematics in Egypt; the Calendar and Measurements of Time; Greek Mathematics; Pythagoras; Beginnings of Rational Medicine; the Hippocrates; the Sophists; Circle Measurements; Aristotle; Euclid; Archimedes; Earth Measurements; Beginnings of Human Anatomy; Mathematics and Astronomy at Alexandria; Ptolemy; Hindu Astronomy; Arabian Contributions to Mathematics and Astronomy; Renaissance and Sciences; Alchemy; the Compass; Clocks; Textiles; Printing; the New Astronomy,—Copernicus, Tycho Brahe, Kepler, Galileo; Medicine and Chemistry, Anatomy; Vesalius; Higher Algebraic Equations and Symbolic Algebra; Gregorian Calendar; Harvey and Blood Circulation; Studies of the Atmosphere, Barometer, gases; Phlogiston; Beginnings of Chemistry; Bacon and Descartes; and thus on to the great wave of mathematical and natural science discoveries of the eighteenth and nineteenth centuries which cannot even be enumerated here.

The book is enlivened thruout by appropriate quotations from the men who did the work and from appreciative commentators on that work. In a series of appendices are more lengthy documents, —as, the oath of Hippocrates, Dedications by Copernicus and Harvey, Gallileo before the Inquisition, and the like. Appendix I enumerates and discusses briefly some leading inventions of the last two centuries.

The volume closes with a table of the important dates in the history of science and of civilization, a brief list of reference books, and an index. Each chapter closes with a list of references.

The book is attractively made up and printed.

A Short History of Science, by Sedgwick and Tyler. Illustrated, 474 pages. The Macmillan Co., New York, 1917. Price, $3.50.

BIOCHEMICAL CATALYSTS IN LIFE AND INDUSTRY

This volume discusses only the proteolytic enzymes, being the second volume by the author on enzymes and their uses. A preliminary chapter discusses the nature of the transformations that take place in the living cell, the inorganic catalysts, the biochemical catalysts, the theories as to their mode of operation, and a classification of proteolytic enzymes based on the number of molecules of

water they are capable of fixing in a molecule of albumin. Following Schutzenberger's conception of the structure of the polypeptide molecule, the author presents a very attractive and cogent statement of the mechanism of progressive hydrolysis of these molecules under ferment action.

The general discussion proceeds under these heads:—The *Coagulating Catalysts,*—thrombin, myosinase, and rennet; *Pepsin; Trypsin,* both pancreatic and from various animal and vegetable sources; *Erepsins,* including those secreted in the intestines, the poorly defined peptolytic enzymes which act on so-called peptones, nucleases which transform the phosphoric nucleo-proteins, arginase, and a small group of creatin-destroying catalysts; and the *Amidases,* the group of enzymes which aid in the final decomposition of the amino-acids,—the last stages of the reduction of the protein molecule before assimilation or excretion.

The statement of the nature, origin, mode of isolation, properties, and physiological role of these vital substances is extremely lucid, and meets the need of the general biologist who has not the opportunity to keep abreast with the more technical aspects of this department of biochemistry.

Most general readers will be especially attracted to Part VI, which deals with the applications of these organized catalysts to medicine and industry, together with the grounds upon which such applications are possible. The author traces the use and abuses of pepsin in therapeutics, and progress made in standardizing tests of its efficiency both as to dissolving and in actual peptonizing power. Reference is made to peptones, both peptic and pancreatic, offered as an easily assimilable diet for greatly debilitated patients. Similar preparations are used in making culture broths in bacteriological laboratories.

In a similar way diagnosis of stomach states is made by analysis of the gastric contents at different stages of test meals, with a view to obtaining the amount of chemical change, the acidity, and the enzymic contents. The author holds that the disrepute into which this determination has fallen is due to poor methods of application rather than to any fault of the principle itself.

In preservation and use of grains and flours native proteolytic

enzymes, and those produced by micro-organisms on the surface of the grains or placed in the flour purposely, bring changes that must be considered. So in brewing and in grain distillation, these biological catalysts play an essential role. The same processes are seen in the milk ferments and in the ripening of cheeses. In the latter some of the enzymes are native to the milk, some are produced by micro-organisms, and rennet is added artificially.

There is an interesting discussion of the relation of the proteolytic milk ferments to intestinal putrefaction. The writer himself has done work with the Bulgarian ferment, and his views as to the cause of the benevolent intestinal action of the various clotted milks are contrasted with those of Metchnikoff and others.

Other topics discussed are:—putrefaction, enzymes operative in tanning, biocatalysts of the soil, assimilation of atmospheric nitrogen, fertilizers, recovery of nitrogenous wastes, and artificial nitrogenous foods.

As the outcome, largely, of his own experiments the author sums up his conclusions in respect to the last item thus:—"It appears that there is ample proof that the organism draws all its nitrogenous constituents from the hydrolysis of proteins. These may result either from the actual process of digestion, or from artificial means, like the action *in vitro* of proteolytic enzymes or the action of concentrated acids. In all events, these [artificially reduced nitrogen molecules] are directly assimilable substances and should be considered as food materials of great nutritive value.

In fact, it has been established that a mixture of amino-acids, containing qualitatively and quantitatively all the principal products of the complete hydrolysis of proteins, can replace the albuminoid foods, and as such maintain the animal organism in nitrogenous equilibrium." The writer is convinced that nutrition can ultimately be effected more economically and rationally by the substitution of some of these artificially produced nitrogenous foods for the complex natural ones, such as meat.

Each chapter is followed by a bibliography; and an index closes the book. The mechanical part is well done.

Biochemical Catalysts in Life and Industry, by Jean Effront. Translated by Samuel C. Prescott, 752 pages. John Wiley and Sons, New York, 1918. Price, $5.00, postpaid.